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EXAMINER	
BERNS, DANIEL J	

ART UNIT	PAPER NUMBER
1793	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/593,054	WHITNALL ET AL.	
	Examiner	Art Unit	
	DANIEL BERNS	1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 January 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-61* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *4,5,10,11,14,19,35,36,41,42,45,50 and 61* is/are allowed.

6)☒ Claim(s) *1-3,6-9,12,13,15-18,20-34,37-40,43,44,46-48 and 51-60* is/are rejected.

7)☒ Claim(s) *21 and 52* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *15 September 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *9-15-06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claims 21 and 52 are objected to because of the following informalities: said claims each contain the term "1,4-bis(tirethoxysilyl)benzene[,]" which is a misspelling of the term "1,4-bis(triethoxysilyl)benzene[.]" Appropriate correction is required.

Double Patenting

2. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). *See, e.g., In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the

scope of a joint research agreement. Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

3. Claims 1 and 31 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over respective claims 1 and 6 of U.S. Pat. No. 6,960,551 to Ozin et al. ("Ozin"). Similar to instant claims 1 and 31, Ozin teaches a functionalized, porous crystalline metal oxide framework material bearing at least one organic functional group bonded to at least two of the framework metal atoms, and a process for making the same comprising polycondensing an appropriate organometallic compound in the presence of a surfactant. *See id.* at clms. 1 and 6.

Apart from the spectral data in Ozin's claim 1 not present in the instant claims, Ozin's claims also differ from instant claims 1 and 31 in that Ozin's claims require their organic functional group(s) to contain at least one sulfonate moiety. *See id.*

However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to not require such sulfonate groups in the doubly-bound organic functional groups, since it has been held that the omission of an element or limitation with a corresponding loss of function is an obvious variation. *See In re Kuhle*, 188 USPQ 7, 9 (CCPA 1975).

4. Claims 1, 17, and 28-30 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 26, 29-30 and 36 of copending Application No. 11/232,431 (published as US 2007/0173401 to Landskron et al. on 7/26/07) ("Landskron"). Applicant should note that this is a provisional obviousness-type double patenting rejection because the conflicting claims have not yet been patented.

Similar to instant claim 1, Landskron teaches a porous material comprising framework atoms covalently bound to two or more organic bridging groups. *See id.* at clm. 26.

Landskron's claim 26 differs from instant claim 1 in that the former requires its porous material to be periodically ordered. *See id.* This limitation is absent from instant claim 1.

However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to not require instant claim 1's structure to be periodically ordered, since it has been held that the omission of an element or limitation with a corresponding loss of function is an obvious variation. *See In re Kuhle*, 188 USPQ 7, 9 (CCPA 1975).

Similar to instant claim 17, Landskron teaches that its porous, organically-functionalized material is periodically ordered. *See id.* at clm. 26.

Similar to instant claim 28, Landskron teaches the formation of its porous material as a powder. *See id.* at clm. 29.

Similar to instant claim 29, Landskron teaches the formation of its porous material as a film. *See id.* at clm. 30.

Similar to instant claim 30, Landskron teaches the formation of its porous material as a monolith. *See id.* at clm. 36.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 32 and 44 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. These claims respectively recite the limitations "the colloidal crystal[ ]"

and "the mesoporous metaloxide[.]" There is insufficient antecedent basis for these limitations in the respective claims.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 1-3, 6-7, 31, 33 and 37-38 are rejected under 35 U.S.C. 102(a) as being anticipated by Lyu's article (appears in Applicant's Information Disclosure Statement – "IDS") ("Lyu"). Regarding claims 1-3, 31 and 33, Lyu discloses a hybrid mesoporous metal oxide that is bound chemically to an organometallic molecule, namely a surfactant, via multiple chemical linkages. *See id.* at p. 2310, cols. 1-2.

Regarding claims 6-7 and 37-38, Lyu discloses that such metal oxides as silica, zirconia, and/or titania may be employed. Sulfate precursors of the latter two materials are transformed into the corresponding oxides by calcination after binding with the surfactant. *See id.*

9. Claims 1-3, 6, 8-9, 12, 17, 28, 31-34, 37, 39-40, 43, 48, and 59 are rejected under 35 U.S.C. 102(b) as being anticipated by the 1999 article of Asefa et al. (appears in applicant's IDS) ("Asefa '99"). Regarding claims 1-3, 31 and 33-34, Asefa '99 discloses a hybrid mesoporous organometallic oxide, bearing an organic group chemically attached to the oxide's porous framework via two chemical bonds, and formed by polycondensation of a suitable framework

precursor and an organometallic material in the presence of a surfactant templating material. *See id.* at p. 867, col. 2 to p. 868, col. 1, and p. 870, col. 2.

Regarding claims 6 and 37, Asefa '99 discloses the use and production of mesoporous silica. *See id.* at p. 868, col. 2, p. 869, col. 2 (disclosing a pore diameter of 39.4 Å, or 3.94 nm).

Regarding claims 8-9, 12, 39-40 and 43, Asefa '99 discloses the use and production of mesoporous organosilica. *See id.* at p. 867, col. 2, p. 868, col. 2, and p. 870, col. 2.

Regarding claims 17 and 48, Asefa '99 discloses a hexagonal periodic arrangement of its product material's pore channels (and hence, the walls surrounding said channels). *See id.* at p. 868, col. 1-2. Periodic mesoporous organosilica is also found at p. 867, col. 2 and p. 870, col. 2.

Regarding claims 28 and 59, Asefa '99 discloses the formation of a powdered material as its hybrid porous product. *See id.* at p. 870, col. 2.

Regarding claim 32, Asefa '99 forms its porous framework material by mixing a suitable precursor with a supramolecular template (such as a surfactant) under conditions allowing the polycondensation reaction to progress, and subsequently removes the template from the product's pores by mild solvent extraction or ion exchange. *See id.* at p. 868, col. 1. Asefa '99's white, powdery product is implicitly crystalline, as it was analyzed by powder X-ray diffraction. *See id.* at p. 870, "General synthesis" and "Surfactant removal" sections, and p. 868, col. 1.

10. Claims 1-3, 6-9, 12, 15-17, 20-29, 31-34, 37-40, 43, 46-48 and 51-60 are rejected under 35 U.S.C. 102(b) as being anticipated by Inagaki, Pat. No. 6,248,686 (appears in applicant's IDS) ("Inagaki"). Regarding claims 1-3, 31, and 33-4, Inagaki discloses the binding of porous or mesoporous metal oxide framework materials with various organic groups via at least two metal-to-organic covalent bonds. *See id.* at, *e.g.*, col. 2, ln. 6-18, col. 5, ln. 24-60, and col. 6, ln. 10-16.

The organo-metal oxide is formed by polycondensation of the reactants, preferably in the presence of a surfactant template. *See id.* at col. 2, ln. 46-58. The framework materials comprise pores, pore walls, and tunable porosity, *see id.* at col. 5, ln. 24-44, and are made up of a main chain comprising two or more metallic atoms, at least one oxygen atom, and at least one organic linking group bound to at least two of the metal atoms. *See id.* at col. 5, ln. 24-28; Fig. 1. Stated alternatively, the main chain forms the framework's pore walls. *See id.*

Regarding claims 6 and 37, silica is a preferred metal oxide. *See id.* at col. 5, ln. 53-65.

Regarding claims 7 and 38, oxides such as those of Al, Zr, Ta, Nb, Sn, W, Mg, Mo, Ga are also disclosed as appropriate. *See id.* at col. 5, ln. 61 to col. 6, ln. 16, and col. 12, ln. 23-25.

Regarding claims 8-9 and 39-40, porous and specifically mesoporous organo-metal oxides are disclosed. *See id.* at col. 5, ln. 53-57 and col. 6, ln. 18-44.

Regarding claims 12 and 43, silica-based organometaloxides are disclosed. *See id.* at col. 6, ln. 1-2, 18-23 and 47-67, col. 11, ln. 55 to col. 12, ln. 2; Figs. 1, 53, 55, and 57A-C.

Regarding claims 15-17 and 46-48, Inagaki discloses product formation possessing a high degree of structural regularity and crystallinity. *See id.* at Example 16. The product disclosed was of a periodic, hexagonal structure. *See id.*

Regarding claims 20-21 and 51-52, Inagaki discloses the use of silsesquioxanes such as bis(triethoxysilyl)methane, 1,2-bis(triethoxysilyl)ethane, 1,2-bis(triethoxysilyl)ethylene, 1,4-bis(triethoxysilyl)benzene. *See id.* at col. 11, ln. 32, 34 and 39; Examples 17-18; Figs. 1, 53, 55, and 57A-57C.

Regarding claims 22-23, 26, 53-54 and 57, Inagaki's porous framework materials' pore walls are at least partially and/or substantially completely covered by the organic groups bound

thereto. *See id.* at col. 5, ln. 24-51. The bound organic groups thus inherently form at least one layer upon said pore walls. MPEP 2112.

Regarding claims 24-25 and 55-56, the organic groups bound to the framework materials' pore walls are of one or more types. *See id.* at Examples 1-2 and 17-18.

Regarding claims 27 and 58, the links between Inagaki's porous framework material and the organic groups bound thereto are Si-O-Si and/or Si-R-Si (R being an organic group) links. *See id.* at col. 6, ln. 1-4 and 18-32; Fig. 1.

Regarding claims 28-29 and 59-60, Inagaki's porous organo-metal oxide may be formed as a powder or film. *See id.* at col. 8, ln. 32-46.

Regarding claim 32, Inagaki forms its porous framework material by mixing a suitable precursor with a supramolecular template, such as a surfactant, under conditions allowing the polycondensation reaction to progress, and subsequently separates off the template from the product precipitate or gel. *See id.* at col. 13, ln. 65 to col. 14, ln. 19, and col. 15, ln. 9-18. Suitable templates are disclosed from col. 12, ln. 44 to col. 13, ln. 63.

11. Claims 1-3, 6, 8-9, 12-13, 15, 17-18, 24, 27-28, 31-34, 37, 39-40, 43-44, 46, 48-49, 55, and 58-59 are rejected under 35 U.S.C. 102(b) as being anticipated by the 1998 article of Fowler et al. ("Fowler") (full citation appears in PTO-892). Regarding claims 1-3, 31 and 33-34, Fowler discloses a hybrid mesoporous organometallic oxide, bearing an organic group chemically attached to the oxide's porous framework via multiple chemical bonds, and formed by polycondensation of a suitable framework precursor and an organometallic material under acidic or basic conditions and in the presence of a surfactant templating material. *See id.* at p. 1825, cols. 1-2, and p. 1826, col. 1 (^{13}C CP MAS NMR data discussion).

Regarding claims 6 and 37, Fowler discloses the use and formation of silica. *See id.* at p. 1825, col. 1.

Regarding claims 8-9, 12-13, 39-40, and 43-44, Fowler discloses the use and formation of mesoporous MCM-41-type organosilica. *See id.* at p. 1825, cols. 1-2.

Regarding claims 15, 28, 32, 46 and 59, after mixing the framework precursor (here, tetraethoxysilane – "TEOS") with the organic-group containing compound in the presence of hexadecyl(trimethyl)ammonium bromide (aka "CTAB") under conditions allowing the framework material to self-assemble and polycondense, Fowler removes the CTAB by chemical extraction from the newly-formed, crystalline product powder. *See id.* at p. 1825, cols. 1-2. The product's crystalline and powdery nature is implicitly disclosed given Fowler's analysis of the product by X-ray powder diffraction. *See id.*

Regarding claims 17 and 48, Fowler's mesoporous organosilica product is periodically-ordered in a hexagonal fashion. *See id.* at p. 1825, cols. 1-2; Fig. 2.

Regarding claims 18 and 49, Fowler discloses that a disordered organo-silica hybrid product results from acid-extracting CTAB from the polycondensate produced under basic conditions. *See id.* at p. 1825, cols. 1-2.

Regarding claims 24 and 55, only 3-(2,4-dinitrophenylamino)propyl(triethoxy)silane is employed as the organic-bearing group. *See id.* at p. 1825, col. 1.

Regarding claims 27 and 58, Si-O-Si and Si-C linkages are disclosed via the product's FTIR spectral data. *See id.* at p. 1826, col. 1.

Allowable Subject Matter

12. Claims 4-5, 10-11, 14, 19, 35-36, 41-42, 45, 50, and 61 have not been rejected under the nonstatutory obviousness-type double patenting doctrine or either 35 U.S.C. 102 or 35 U.S.C. 103 because the limitations of these claims are not taught or suggested by the references of record.

13. The following is a statement of reasons for the indication of allowable subject matter: the references above fail to disclose or suggest the use or production of a) macroporous metaloxides as required by claims 4 and 35; b) mesoporous-macroporous metaloxides as required by claims 5 and 36; c) macroporous organometaloxides as required by claims 10 and 41; d) mesoporous-macroporous organometaloxides as required by claims 11 and 42; e) amorphous porous framework material pore walls as required by claims 14 and 45; f) inverted opal-shaped porous framework materials as required by claims 19 and 50; and g) monolithic hybrid porous product materials as required by claim 61.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DANIEL BERNS whose telephone number is (571)270-5839. The examiner can normally be reached on Monday thru Thursday, 9AM-6PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached at (571)272-1358. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications

may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/D. B./ January 30, 2009
Examiner, Art Unit 1793

/Timothy C Vanoy/
Primary Examiner, Art Unit 1793